

Natural gas whole-bar rapid-heating furnace

"The production personnel have pushed billet heating set-point to the limit. The technology is new and does not follow all the characteristics of the conventional forging process. This was quite the learning exercise and the Ministry of Environment and Energy greatly improved our chances of success."

Claude Hetu
President
Gananoque Steel Forging Inc.
Gananoque, Ontario

THE COMPANY

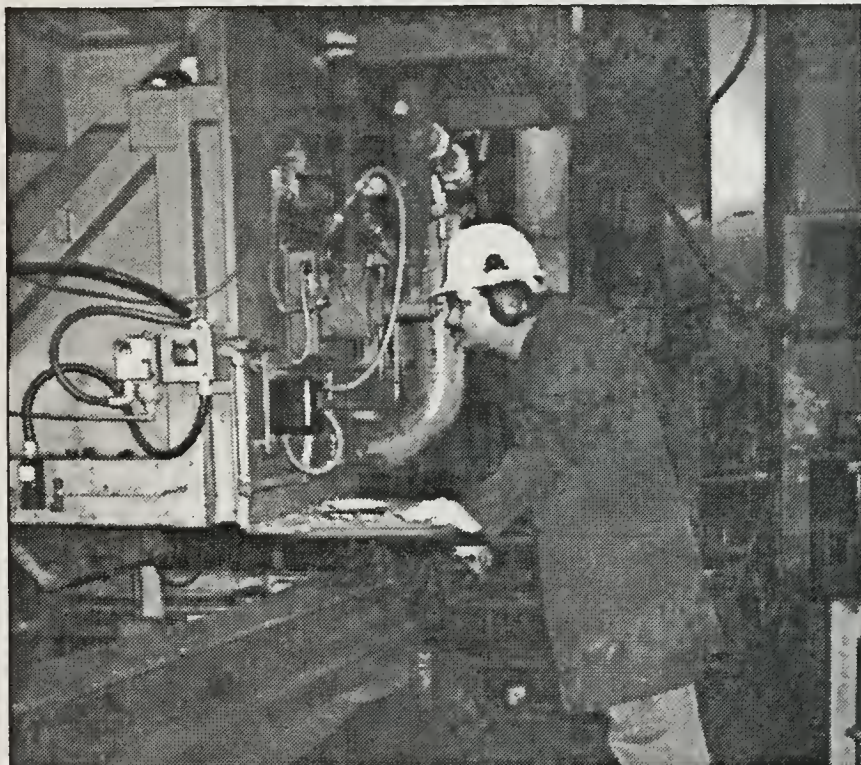
Gananoque Steel Forging Inc. is an employee-owned plant founded in 1910. The company is a leading producer of forged pieces for clients in the automotive industry, including Ford, Chrysler and component suppliers.

THE CHALLENGE

During the heating of a raw billet of steel to forging temperature, the time spent at high temperature in an oxidizing atmosphere causes the carbon in the surface of the billet to burn out, or decarburize. Excessive decarburization can make the material too weak for components that will be subjected to high stress. A shorter heating cycle minimizes this effect.

In 1992, Gananoque Steel Forging needed to expand its capability for the precision forging of a connecting rod used in automotive engines. The manufacture of this part was scheduled for the next automotive model year and the plant had only one hammer, equipped with an electric induction heater, that was capable of meeting the specifications for dimensions and surface decarburization of the connection rods, which are highly stressed in use. And the plant did not have enough electrical capacity to operate another induction heater.

The company identified the need for an energy-efficient, rapid-heating furnace to feed into a new forging



Rapid Heating Furnace

hammer. This would minimize scale formation, reduce energy consumption, improve productivity and meet the stringent metallurgical requirements.

THE SOLUTION

Gananoque Steel Forging saw the natural gas whole-bar rapid heating furnace sold by Rapid Technologies Inc. of Newnan, Georgia, as the key. The rapid furnace is a convective heating system that promised surface decarburization depths equivalent to electric induction heating and the ability to come to full forging temperature from a cold start in about 20 minutes.

Standby capabilities allow the billet temperature to drop below the scaling temperature of 1600°F (868°C) and be raised back up to forging temperature in less than five minutes. This minimizes scaling and reduces downtime.

The rapid gas furnace uses only 70 per cent of the energy of electric induction heating and reduces cooling water use by up to 200,000 U.S. gallons (about 755,000 litres) per day. The capability of the furnace to provide uniform billet heating and minimize scale jacket has improved product quality and reduced the number of reject pieces.

OPPORTUNITIES

The natural gas whole-bar rapid-heating furnace may be used by companies currently using conventional forging technology. The technology offers the opportunity to reduce energy costs compared to induction heating and substantially decrease cooling water use.

This saving in energy represents a potential 3 per cent gain in the profitability of the manufacturing operation at Gananoque Steel Forging speci-

cally where the rapid heating furnace could operate in lieu of the induction heater. The improved product quality and productivity has generated new business opportunities for the company estimated annually at \$3.5 million.

PARTNERSHIP IN POLLUTION PREVENTION AND RESOURCE CONSERVATION

Industrial companies located in Ontario may seek ministry/industry services that will help them to:

- * reduce, reuse and recycle solid waste;
- * reduce or eliminate liquid effluent and gaseous emissions;
- * use energy and water more efficiently.

Equipment and services supply companies can benefit from the information provided on technologies identified for business development.

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